PENGARUH TEKANAN KEMPA DAN KOMPOSISI CAMPURAN SERBUK ARANG KAYU MINDI (*Melia azedarach* L.) DENGAN SERBUK BATUBARA TERHADAP SIFAT FISIK-KIMIA BRIKET ARANG-BATUBARA

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INTISARI

Energi merupakan kebutuhan mendasar dalam aktivitas kehidupan manusia. Tuntutan akan kebutuhan energi ini semakin meningkat seiring dengan perkembangan zaman. Pemenuhan energi yang masih dominan penggunaannya adalah minyak bumi, padahal sumber energi ini pada suatu saat akan habis. Dipertegas lagi bahwa kebijakan pemerintah Indonesia dalam waktu dekat mengisyaratkan akan dihapuskannya subsidi minyak. Untuk mengatasi permasalahan tersebut maka perlu dilakukan pencarian dan pemanfaatan berbagai sumber daya energi yang potensinya masih melimpah, seperti batubara dan hutan. Pemanfaatan batubara dan hutan untuk alternatif sumber energi ini, digunakan batubara mentah serta sisa (limbah) kayu mindi yang dibuat briket arang-batubara.

Penelitian dilakukan di Laboratorium Energi Kayu Fakultas Kehtanan, Universitas Gadjah Mada. Percobaan dilakukan dengan rancangan acak lengkap dengan pola faktorial. Faktor pertama terdiri atas 3 tekanan kempa, yaitu : 2000 lb/ in², 2500 lb/ in², 3000 lb/ in². Faktor kedua terdiri atas 5 komposisi campuran, yaitu : 100% mindi, 75% mindi 25% batubara, 50% mindi 50% batubara, 25% mindi 75% batubara, 100% batubara. Tahap penelitian diawali dengan membuat arang yang berasal dari kayu mindi. Arang kayu mindi dan batubara mentah kemudian dibuat serbuk dengan ukuran lolos saringan 45 mesh tertahan 60 mesh. Kemudian dilakukan pembuatan briket sesuai komposisi campuran dan diberi perekat pati dengan tekanan kempa yang telah ditentukan. Selanjutnya dilakukan pengujian terhadap beberapa parameter yaitu kadar air, berat jenis, nilai kalor, kadar abu, kadar zat mudah menguap dan kadar karbon terikat.

Hasil penelitian menunjukan bahwa interaksi antara faktor tekanan kempa dengan komposisi campuran berpengaruh sangat nyata terhadap terhadap kadar air dan kadar abu, sedangkan pengaruh nyata terhadap berat jenis. Kadar air terendah pada tekanan 3000 lb/ in² komposisi 100% mindi sebesar 7, 85%; tertinggi pada tekanan 2500 lb/ in² komposisi 100% batubara sebesar 17,221%. Kadar abu terendah pada tekanan 3000 lb/ in² komposisi 100% batubara sebesar 1,591%, tertinggi pada tekanan 3000 lb/ in² komposisi 100% mindi sebesar 3,980%. Berat jenis terendah pada tekanan 2000 lb/ in² komposisi 100% mindi sebesar 0,539 ; tertinggi pada tekanan 3000 lb/ in² komposisi 100% batubara sebesar 0,946. Nilai kalor menurun dengan makin tingginya tekanan. Nilai kalor terendah pada tekanan 3000 lb/ in² sebesar 6112,66 kal/g, tertinggi pada tekanan 2000 lb/ in² sebesar 6246,175 kal/g. Nilai kalor menurun dengan bertambahnya komposisi campuran batubara. Nilai kalor terendah pada komposisi 100% batubara sebesar 5631,812 kal/g, tertinggi pada komposisi 100% mindi sebesar 6769,157 kal/g. Kadar karbon terikat menurun dengan makin tingginya tekanan. Nilai terendah pada tekanan 3000 lb/ in² sebesar 51,621% ; tertinggi pada tekanan 2000 lb/ in² sebesar 52,713%. Kadar karbon teikat menurun dengan bertambahnya komposisi campuran batubara. Nilai terendah pada komposisi 100% batubara sebesar 43,431% ; tertinggi pada komposisi 100% mindi sebesar 61,369%. Kadar zat mudah menguap meningkat dengan bertambahnya komposisi campuran batubara. Nilai terendah pada komposisi 100% mindi sebesar 27,138% ; tertinggi pada komposisi 100% batubara sebesar 37,820%. Tekanan tidak berpengaruh terhadap kadar zat mudah menguap.

Kata kunci : tekanan kempa, komposisi campuran, sifat fisik-kimia briket arang-batubara.

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THE EFFECT OF PRESSURE AND MIXED COMPOSITION OF CHARCOAL DUST OF MINDI WOOD (*Melia azedarach* L.) AND COAL DUST ON PHYSICAL-CHEMICAL CHARACTERISTICS OF CHARCOAL-COAL BRIQUETTES

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ABSTRACT

Energy has been a basic necessity of human activities. The increasing demand of energy sources, especially oil, has caused problems in its provision for a scarceness reason. Furthermore, the elimination of oil subsidy by Indonesian government implies that the problems have become more complicated from the economic point of view. Hence, it is necessary to elaborate a quest and utilisation of alternative energy sources. Among which is coal and wood. We use briquette of raw coal and mindi wood to seek such an alternative energy utilisation.

The research is conducted in Laboratorium Energi Kayu Fakultas Kehutanan Universitas Gadjah Mada. Our experiments are based on a complete random design with treatments applied to briquette composition. The first treatment is the application of pressure given at three measures, which is, 2000 lbs/inch^2, 2500 lbs/inch^2, and 3000 lbs/inch^2. The second treatment is differentiation of briquette composition. Five different composition applied constitutes the mixed composition of mindi and coal, respectively. They were: 100:0; 75:25; 50:50; 25:75 and 0:100.

We start the research process by making charcoal originated from mindi and raw coal. Filtered with criterion of 40:60 (40 mesh to be passed and 60 mesh to be hold), the charcoal is processed to generate concentrate which then glued together at five different mixed compositions at given pressures described above to form briquettes. Next, several test of parameters is conducted. The parameters are: moisture content, bulk density, caloric value, ash content, volatile matter, and fixed carbon level.

The results show that variation of pressures given and differentiation of briquette compositions is associated very significantly with the moisture and ash content. As to the bulk density, the association is fairly significant. The lowest moisture content occurred at treatment with 3000 lbs/inch^2 pressure on 100:0 mindi-coal composition, i.e., 7,85 % while the highest occurred at 2500 lbs/inch^2 pressure on 0:100 mindi-coal composition, i.e., 17,221 %. The lowest ash content occurred at treatment with 3000 lbs/inch^2 pressure on 0:100 mindi-coal composition, i.e., 1,591 % while the highest occurred at 3000 lbs/inch^2 pressure on 100:0 mindi-coal composition, i.e., 3,980 %. The lowest bulk density occurred at treatment with 2000 lbs/inch^2 pressure on 100:0 mindi-coal composition, i.e., 0,539 % while the highest occurred at 3000 lbs/inch^2 pressure on 0:100 mindi-coal composition, i.e., 0,946 %. The caloric value decreases as the pressure measure increases. The lowest caloric value occurred at treatment with 3000 lbs/inch^2 pressure, i.e., 6112,66 cal/g while the highest occurred at 2000 lbs/inch^2 pressure, i.e., 6246,175 cal/g. The caloric value also decreases as the coal proportion of mindi-coal compositions increases. The lowest caloric value occurred at treatment with 0:100 mindi-coal composition, i.e., 5631,812 cal/g while the highest occurred at 100:0 mindi-coal composition, i.e., 6769,157 cal/g. The fixed carbon level decreases as the pressure measure increases. The lowest fixed carbon level occurred at treatment with 3000 lbs/inch^2 pressure, i.e., 51,621% while the highest occurred at 2000 lbs/inch^2 pressure, i.e., 52,713%. The fixed carbon level also decreases as the coal proportion of mindi-coal compositions increases. The lowest fixed carbon level occurred at treatment with 0:100 mindi-coal composition, i.e., 43,431% while the highest occurred at 100:0 mindi-coal composition, i.e., 61,369 %. The volatile matter value increases as the coal proportion of mindi-coal compositions increases. The lowest volatile matter value occurred at treatment with 100:0 mindi-coal composition, i.e., 27,138 % while the highest occurred at 0:100 mindi-coal composition, i.e., 37,820 %. Pressure has no effect on volatile matter value.

Key words : pressure, mixed composition, physical-chemical value of charcoal-coal briquettes.

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